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MEDIAN LITHOTOMY.

BY

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THE recognized dangers of lithotomy have, from the earliest times, led surgeons to seek, by various modifications of the operative procedure, to obviate these dangers, and to diminish the fatality of the operation itself. One of these modifications, which early suggested itself, was to avoid altogether any incision of the bladder, and entering the urethra alone with the knife, to prepare a passage for the exit of the stone, by dilating the parts between the external incision and the cavity of the bladder. The old Marian operation was founded upon this idea. It consisted of an incision in the perineum, not always in the median line, which en-

tered the bulbous portion of the urethra, which, with the superficial perineal tissues, was freely incised. Into the urethra, thus opened, were introduced various instruments for stretching the passage into the bladder, and through the passage thus dilated the forceps were introduced and the stone extracted. This operation, which was but rudely executed, embraced a principle which has never been lost sight of; and many attempts have been made to revive it. In the year 1819, Sir Astley Cooper suggested and performed a similar operation, opening the urethra in the perineum, and dilating the passage by the use of Dr. Arnott's dilators, Dr. Arnott himself superintending this part of the manipulations. Manzoni, a surgeon of Verona, about the year 1808, published an account of his method of operating, which consisted of an incision in the median line of the perineum, opening into the spongy portion of the urethra, and dilating the bulbous and membranous as well as the prostatic portions of the canal. De Borsa, also of Verona, made a very important advance on this suggestion, when, in 1843, he recommended opening the urethra at its membranous portion, and dilating only the prostatic portion, which he contended was the most dilatable part of the canal. De Borsa made two incisions: first, an external tegumentary cut; and second, an internal urethral incision, through which he introduced his finger, gradually forcing his way into the bladder. Acting on the suggestions thus presented, Mr. George Allarton, of South Molton, England, contrived an operation, an account of which he published, in 1855, in a little pamphlet which he called *Lithotomy*

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Simplified. Allarton's operation consists of an incision made by a sharp-pointed, narrow knife plunged into the perineum, so as to reach and open the membranous portion of the urethra, and which, on withdrawal, makes the necessary incisions of the perineal tissues. Into this incision a probe is passed down to the staff and into the bladder, as a guide upon which the finger can be introduced through the prostatic urethra into the bladder, thus dilating the passage so as to permit the introduction of the forceps, and, if the stone be of moderate size, the extraction of the stone.

This operation, called, in England, "the Median" or "Allarton's operation," has now been before the English public for about ten years, and has attracted a great deal of attention, both in London and the Provinces. Most of the prominent English surgeons have given their opinion of the operation, and, what is more to the purpose, most of them have tried it. In a book published in 1863, entitled *Median Lithotomy*, Mr. Allarton gives a full history of his operation, and a very complete statement of all the views of the different English surgeons who have published anything on the subject. He gives, also, details of most of the cases in which his operation has been performed, and finally tabulates 170 cases, embracing all of which he could get any account, by himself and by various other operators, of all ages from $1\frac{1}{2}$ to 77 years; and from these he claims a mortality of about one in twelve. In speaking of this table, Mr. Allarton says: "The following list of operations comprises 170 cases, reported by 50 surgeons (hospital and private). They consist

of 153 particularized cases, and 17 not particularized. The ages vary from $1\frac{1}{2}$ to 77 years. The average mortality is 1 in 12, as compared with lateral lithotomy, which is 1 in 5 or 6; a saving of life equal to one half. The mortality from $1\frac{1}{2}$ to 38 years is only 1 in 38 cases. The mortality under 20 years is 1 in 27. Above 20 years, the mortality is 1 in 7 cases, which is far better than the total average of lateral lithotomy at all ages."

My attention was directed to this operation by some of the earliest reports of the English cases, and by some remarks of Mr. Erichsen, and some other writers, not decidedly favorable to it, which appeared in a rather controversial form in the journals. I have been favorably impressed with the operation, and, from a trial of it in twelve cases, I am free to profess myself its warm advocate.

The principle upon which the operation is founded, is to avoid any incision of the bladder or its neck, and, by a dilatation of the prostatic portion, to obtain the necessary access to the bladder through an incision in the membranous portion of the urethra. It is urged, and with some justice, that it is not possible or safe to dilate the prostate sufficiently for the extraction of the largest stones; and this is one of the principal objections advanced against the operation. Two answers may be made to this objection, each of them complete, as I think, in itself. *First*. If more space be positively required, any necessary incision may be made in the prostate, as a secondary step in the operation, by which all the room can be obtained which any other mode of operation can give; and *Second*. Through the direct open-

ing made from the perineum to the bladder, instruments can be introduced into the bladder, with ease and safety, of sufficient size and power to break up the largest stone, and thus remove it, without the infliction of any laceration on the neck of the bladder. On this last suggestion, Mr. Allarton dwells most emphatically. He insists that it is a matter of absolutely no importance that the stone be removed entire, and that it is not only good mechanical philosophy, but good surgery, to break into fragments any stone whose removal entire would endanger the integrity of the important parts through which it would have to be violently withdrawn. He says: "There is no rational excuse for perpetuating lateral lithotomy, when nearly every calculus can be extracted through the median aperture, and those which cannot can readily be crushed." "Surgeons have imbibed the habit of looking upon a urinary calculus as a thing to be held sacred, or, if ever to be crushed, only through a natural passage and by an orthodox lithotrite. They do not hesitate, when they can, to disintegrate this precious gem by solvents, nor do they object to disintegrate it more roughly by means of a lithotrite; yet, strange to say, when the knife is to be used, then, and not till then, does the stone assume a sacred character, and room must be made for it to come forth whole and uninjured."

The steps of the operation are as follows: The patient being secured in the proper lithotomy position, and the grooved staff passed into the bladder, the surgeon introduces the forefinger of the left hand into the rectum, with the palm upward, and ascertains, as accu-

rately as possible, the point at which the membranous portion of the urethra emerges from the prostate. Keeping the forefinger carefully on this point, a long, narrow, sharp-pointed knife is entered on the median line of the perineum, about three quarters of an inch in front of the anus, with its cutting edge looking upward, and pushed steadily forward, guided by the finger, in the rectum, in such a direction that the point of the knife shall reach the groove of the staff just at the junction of the prostatic and membranous portions of the urethra. The operator now making sure that the point of the knife has entered the urethra, draws the knife forward and upward so as to incise the membranous portion of the urethra through nearly its whole extent, and then withdrawing the knife, with its cutting edge still upward, completes the incision of the soft parts to the extent deemed requisite. Along the wound thus made a probe is introduced into the opening of the urethra, and thus on into the bladder, to serve as a guide for the finger. The staff is now removed, and the finger, guided by the probe, is slowly and carefully introduced into the opened urethra, and through the prostatic portion, which yields with surprising readiness to the advancing finger, allowing it, almost without resistance, in most cases, to enter the bladder. The stone can now be felt and its size estimated; and one of three courses is to be pursued. If the stone be of moderate size, the forceps may be introduced along the finger and the stone seized and extracted. If, however, the stone be very large, then with the finger still in the wound, a narrow bistoury may be introduced, and the prostate fur-

ther divided, as in lateral lithotomy, or in any other direction which may give the additional room required ; or, lastly, what is in my judgment by far the better plan, a strong, straight pair of forceps may be introduced, by which the stone can be broken into fragments, and removed without incurring the risk of laceration, or the dangers which are inseparable from a free incision of the neck of the bladder. This finishes the operation proper ; but, as a matter of course, a careful exploration should now be made, to discover the presence of any additional stones or fragments ; and thorough washing out of the bladder with warm water should never be neglected.

The advantages which this operation is believed to present are :

First. The incision, being in the median line of the body, does not encounter any large vessels, and must, therefore, be less liable to hemorrhage than the lateral or bilateral operations. It is true that hemorrhage has occurred after median lithotomy, but is much less frequent and formidable than that which occurs after other operations in which the prostate is divided, and its occurrence is probably to be explained by some accidental deviation of the knife to one side or the other of the median line.

Second. The incision, being in the median line, and not reaching as far back as the verumontanum, cannot injure the seminal ducts, and cannot, therefore, produce emasculation. This I acknowledge is one of the theoretical dangers of lithotomy, the importance and, indeed, the reality of which is still *sub judice* ; still, the

median operation may fairly claim it as an advantage that it presents no danger in this direction.

Third. With the finger in the rectum, the course of the knife can be most precisely appreciated, and ordinary caution only is necessary to avoid wounding the gut in the first plunge of the knife. After the groove of the staff is reached, the direction of the incision is away from the gut, and, therefore, a wound of it is impossible.

Fourth. There is no danger that the incision may fail to reach the bladder. This is one of the rare accidents which may happen to the lithotomist. The knife, slipping out of the groove of the staff, may wander in the areolar interspaces around the neck of the bladder, and the proper incisions may apparently be completed, and yet the bladder has not been opened, and of course the finger, or the forceps, introduced into such a wound, fail to reach the stone. The median operation presents no such danger; as when the urethra is once opened, all that the operator has to do is to pass his finger into the bladder, guided by the staff, or, what is better, guided by a probe or director introduced through the wound.

Fifth. The deep perineal fasciæ not being invaded by the knife, deep infiltration of urine cannot occur. A very considerable percentage of the deaths after lithotomy is caused by the infiltration of urine, which finds its way into the deeper areolar interspaces, through an opening accidentally made, and perhaps too small to be recognized at the time of operation, through the deep layer of the perineal fascia which surrounds the prostate gland. No delicacy of touch can warn the most careful and skillful operator that his knife is traveling beyond

the line of safety, and hence this danger may be said to be inherent in the lateral operation. So great has this danger been acknowledged to be, that several modifications of lithotomy have been devised to meet it, as the bilateral operation, and the operation with a lithotome cachè, where it is intended so to limit the extent of the incision by a mechanical contrivance, that it cannot go beyond the limit of the prostate gland. I consider it as a most important recommendation of the median operation, that this serious accident cannot occur when it is properly performed, and is scarcely liable to happen even to the most clumsy bungler.

Sixth. One of the most interesting and striking features of Median Lithotomy is seen in the behavior of the prostatic portion of the urethra after the operation. It is now generally acknowledged that one important function of the prostate gland is, by virtue of its abundant unstripped muscular fibres, to act as a sphincter of the bladder. In the lateral operation, this sphincter is divided, and, as a matter of course, the urine trickles from the bladder through the wound, there being no power of contraction left in the divided sphincter. The water is thus in constant contact with the recently cut surfaces, to which it is a powerful irritant, and, dribbling out of the wound, runs down upon the bed, saturating the sheets, wetting and excoriating the patient's back, and making his whole condition offensive to himself and others, from the constant and pervading smell of urine. Nothing but the incessant watchfulness of an experienced nurse, and the frequent changing of what is called the "lithotomy sheet," can keep the patient even tole-

rably comfortable, or passably clean. In median lithotomy, all this is changed. The prostate, not having been divided, retains its sphincter power, and the urine does not flow from the bladder, except at the will of the patient. Provision can therefore be made to receive the urine, as it flows through the wound, either in a bedpan, or, in the case of young children, on a folded sheet, which being removed, they are left dry and comfortable. Usually, in from two to four hours after the operation, the patient experiences a desire to pass water, which is accomplished without difficulty through the wound, and then the bladder remains quiet, until a sufficient accumulation of urine has taken place to again provoke the desire to empty the bladder. In most cases, this regular action of the bladder goes on throughout the cure, no dribbling of the urine taking place at any time. In a few instances, either in consequence of severe stretching, or perhaps laceration of the fibres of the prostate, the retentive power of the bladder is not so well preserved, and then the urine leaks more or less constantly into the bed. I am not disposed to claim for this feature of the operation any important bearing on the success of median lithotomy, but I do claim that it adds most materially to the comfort of the patient, and thus, I believe, contributes indirectly to the rapidity, and perhaps to the certainty, of a favorable termination of the case.

In performing this operation, it will readily be perceived that we are not dependent upon any condition of the bladder for its safe completion, and therefore the distention of its cavity with a certain amount of urine,

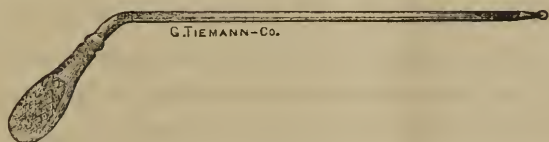
or the injection of warm water, is in no way necessary. The median section is as easily and as safely made with an empty as with a full bladder.

As far as my own experience goes, the principal difficulty, if not the only one, in the performance of the median operation, consists in making the point of the knife reach the groove of the staff with certainty and precision. Deviation to one side or the other of the median line, to a very small degree, will throw the point of the knife away from the groove, and the staff is passed by the knife, which penetrates the tissues by the side of the membranous portion of the urethra. I am satisfied that this is a positive danger, and though in the hands of any careful surgeon, such wandering of the point of the knife might never do serious mischief, yet in the hands of an inexperienced operator, I can conceive that extensive or even fatal injuries might be inflicted. This important step of the operation can only be well done by carefully bearing in view the relations of the parts, and with a cool eye and steady hand appreciating the direction in which the point of the knife is traveling, and correcting any deviation, partly by the eye and partly by the finger in the rectum, against which the back of the knife ought constantly, though slightly, to press. In order to make this step of the operation more sure and more easy, I have had my staff made with a very wide, and at the same time a very shallow, groove. The depth of the groove, which is so essential in the lateral operation, for keeping the point of the knife in its channel while the incision of the prostate is being made, is in the median operation no longer nec-

essary. All that is required in the median is that the urethra be reached by the point of the knife, and then the incision passes forward in a direction away from danger, and a shallow groove is sufficient to guide the knife. By flattening out, as it were, the groove in the ordinary staff, we obtain, without increasing the actual size of the instrument in the urethra, a larger transverse diameter, and thus make it almost impossible to fail in reaching the groove in the deepest perineum.

Another feature of Mr. Allarton's method of operating, in which I think improvement may be made, is in the mode of guiding the finger into the bladder after the urethral opening is made. Mr. Allarton recommends a long probe, which I doubt not is sufficient in most cases; but it must be remembered that the incision in the urethra is a linear one, and one which has no tendency to gape open to receive the advancing finger; rather, the finger, as it approaches the urethra, would, I think, have a tendency to close the slit in its walls. I found, in my early operations with the probe, that there was a positive difficulty here, which led me to substitute for the probe a second staff, which, being introduced into the wound with the groove upward, while the first staff was still retained *in situ*, gave me, between the two grooves, an easy and certain entrance into the urethra. To meet this point more perfectly, or at least less clumsily, Dr. J. L. Little, of this city, who has taken a great deal of interest in this operation, and has contributed several cases of its successful performance, devised a sort of slender gorget, or rather a broad, straight and short staff, with a flat, tapering groove and a probe

point, which is easily introduced into the opening of the urethra, and then being pushed on into the bladder, as the urethral staff is withdrawn, forms the best possible guide for the finger or for the forceps. The staff portion of this instrument is about six inches long, with a handle set at an angle with the blade of about forty-five degrees, so that the hand which holds it shall be out of the way of the manipulations. This simple instrument I have used in all my later operations, and it seems to me to fulfill the indications in the most satisfactory and perfect manner. It was made by Messrs. Tiemann & Co., 63 Chatham street.



Much was said, in the early history of the median operation, about dilators, and the mode of safely conducting the dilating process. This point seems, by the later writers, to be less insisted on, and, indeed, I find that many operators do not employ, in the extraction of the largest stones, any dilator except the stone itself. Indeed, Mr. W. Cadge, of Norwich, Eng., gives an account of a stone weighing four ounces, five drachms and a half, which he removed from a man of sixty-three, without any preliminary dilatation except what he could accomplish by the finger. Of course, in extracting large stones, the dilatation is produced by the stone grasped by the forceps, drawn steadily and forcibly by the operator against the neck of the bladder; and precisely here lies the difficulty and danger of extraction, in every

mode of operation. It is idle to affirm that an incision, seven-eighths of an inch long, through the left lobe of the prostate, will of itself give us any material increase of room in the extraction of a stone, which, like that of Mr. Cadge, measured three inches in its longest by two inches and one and a half inches by its shortest diameters. Any help that we gain by such an incision must be so merged in the general dilatation and laceration as to be insignificant; and the whole question seems to me to be, whether, in the violent and extreme dilatation necessary for the removal of a very large calculus, the patient's safety is in any degree secured by having a large incision made in one side of the prostate gland. I cannot help believing that instead of being an element of safety, such an incision is an element of danger; that it might determine a laceration of the fibrous covering of the prostate, and the deep perineal fascia, instead of preventing it, and this more certainly and more disastrously if the capsule of the prostate have been, at any point, touched by the edge of the knife. I am strongly of opinion that the precept of sound surgery, in this matter, should be, that no very large stone should ever be drawn through the neck of the bladder, whether the prostate be divided or not, but that every stone which by its size is likely to do mischief if forcibly dragged entire through the wound, should be reduced to fragments and removed piecemeal. To accomplish this crushing of a large stone, is ordinarily a very easy process. By means of a straight, strong pair of forceps, with long handles to increase the leverage, any ordinary stone may be easily broken. Those which are harder

may be crushed by the largest and strongest lithotrite. There may be, as a rare exception, some stone so large and so hard, that it refuses to yield to either of these instruments, and here it might be useful to have an instrument which would drill the stone in various directions, and thus prepare it to yield to the crushing force. But suppose all these plans to fail, and the recusant calculus, from its size and hardness, defies all our efforts to reduce it; the median operation leaves the parts in as good a condition for gaining space, by additional incisions, as either the lateral or bilateral methods; and if the violent evulsion must take place, it can be accomplished as well and as safely by the median, thus modified, as by any other operation. At the same time, while I do not deny the possibility of its occurrence, I think such an obstinate calculus must be so rare as practically to be left entirely out of consideration.

The following cases, being all that have presented themselves to me since my attention has been directed to the median operation, were operated on either at the New York Hospital or at the Clinique of the College of Physicians and Surgeons. In addition to my own cases, I have presented a number contributed by my friends, in most of which I have been present and assisted at the operation. Dr. Albert G. Walter, of Pittsburgh, Pa., has been for some years giving his attention to the subject of median lithotomy, and has published nine successful cases of the operation. His cases appear in Mr. Allarton's work, *Median Lithotomy*, and as they appear to represent all his experience during the period from 1847 to 1856, we may fairly include them

in our table of American cases, which would then present the simple record of thirty-one cases, of which all were successful.

CASE I.—Frank Crane, October 8th, presented himself at the Clinique of the College of Physicians and Surgeons, with stone in the bladder. He had had some symptoms of the trouble for about three years, but during the last four months has suffered severely. The symptoms were well marked, but presented no unusual features. The steel sound easily detected a stone, which did not seem to be a large one. After some preparatory treatment, the operation was performed by the median section, on November 4th, 1861. A staff with a large groove being first passed along the urethra, and held by an assistant, the finger of the left hand was passed into the rectum, and the precise position of the prostate gland carefully determined. With the end of the finger resting as a guide upon the anterior, inferior surface of the prostate, a long, narrow-bladed, sharp-pointed knife was introduced about half an inch in front of the anus, with its back toward the rectum, and plunged carefully down exactly in the median line, so as to touch the staff just at the apex of the prostate gland. When the point of the knife was felt to be fairly lodged in the groove of the staff, the blade was carried upward far enough for the point to divide, as I supposed, about the space of the whole membranous portion of the urethra, and the incision was completed by withdrawing the knife, cutting upward as it came out, so as to make an external incision of an inch and a half along the median raphe of

the perineum. The staff still remaining in the urethra, a steel sound was introduced along the wound, into the opening of the urethra, and used so as to hold open the urethral incision, and thereby permit the introduction of the index finger of the right hand into the opened canal. The point of the finger thus introduced, by a steady boring motion, was, after a little time, and without any violence, pushed on into the bladder, through the yielding prostatic portion of the urethra, and upon the finger there was no difficulty in introducing the forceps and grasping the stone. Some trouble was experienced in drawing the stone out of the bladder, but this was explained by the size of the stone proving much greater than we had anticipated. The extraction was finally accomplished without accident, and the patient sent home and put to bed. Three hours afterward he got up, and passed, by a voluntary effort, several ounces of urine through the wound in the perineum, and from this time forward the urine was retained and passed at will. For the first few days, the passage of the urine over the wound gave a scalding sensation, which was very painful, and for a time also the passage seemed so irritable, that the urine flowed out the instant the desire occurred, so that it was not possible at all times to keep his bed dry, but no leaking or involuntary dribbling at any time took place, and but for the suddenness with which it was occasionally passed, no wetting of the bed would have occurred. By the liberal use of morphine, these symptoms were soon relieved. But one curious result followed: the scalding, on passing water, induced him to retain his urine as long

as he could, and as soon as the irritability of the bladder was relieved by the morphine, retention occurred, and for a day or two I feared I should be obliged to resort to the catheter. By continuing the anodyne, however, the scalding abated, and he gradually began to empty the bladder at regular and proper intervals. On November 13th, the urine was passing mainly by the urethra, a few drops only escaping by the wound. He was confined to his bed about a week, and on November 14th, he was allowed to go out, as the weather, though cold, was fine. His appetite and digestion are perfect; he sleeps well at night, not rising more than once to pass water. On the 18th, he presented himself at the College Clinique, with the wound in perineo, a mere pin-hole, and the passage of urine by the urethra perfectly free and comfortable. His cure was soon perfect.

CASE II.—John Ketch, æt. 3 years, was brought to the College Clinique in May, 1862, with symptoms of stone in the bladder, with which he had been suffering about 16 months. The sound readily detected a small stone, and on the 26th of May, I performed on him the operation of median lithotomy. The steps of the operation were similar to those in the preceding case, and I experienced no difficulty in gradually forcing my little finger through the prostate. The forceps were then introduced, and a small, roundish stone, about half an inch in diameter, removed. No bad symptom followed. He was able to retain his water almost completely from the time of the operation, and passed it whenever he chose to do so. A little water escaped by the wound

for three or four days, and then all came by the urethra. He suffered from some pains about the neck of the bladder on the seventh, eighth and ninth days, but from what cause was not apparent. This soon disappeared, and his recovery was complete.

CASE III.—Edwin Harper, æt. 13, Vermont, was admitted to the New York Hospital, April 11th, 1863. Eighteen months previously, he had injured his urethra by a fall into a barrel, the chine of which struck him on the perineum. A considerable laceration of the integuments of the perineum was produced, probably involving the urethra, for retention of urine occurred, and the physicians under whose charge he was placed, were unable to pass the catheter. In consequence of this, infiltration of urine took place, resulting in the sloughing of a certain extent of perineal tissues. In order to make a free opening for the urine, the bladder was tapped above the pubes, and a canula was worn, according to the patient's statement, for about four months. Several operations were attempted for the restoration of the urethral canal, with such success that a bougie was finally passed along its whole length into the bladder. The wounds in the perineum, and that over the pubes, gradually healed, except a small fistulous track, from which a few drops of urine would occasionally escape. The bougie was worn continually, and was changed once in twenty-four or forty-eight hours by the patient himself. In this way it had been worn for eight months. He was not able to get out of bed, where he had been confined for nearly a year; otherwise, though

pale and delicate-looking, his health was good. On removing the bougie and passing a good-sized steel sound, the urethra was found to present no point of contraction. The instrument passed readily into the bladder, where a stone was immediately encountered. After some little preliminary care, the median operation was performed in the usual way, on the 17th of April, and eleven calculi were extracted with great ease. None of these stones were large, but their aggregate weight was 208 grains. After the operation, there was no dribbling of urine through the wound. When he desired to make his water, it escaped freely. This was the case during all his recovery, which was rapid and satisfactory. His general health improved as soon as the local cause of irritation was removed. From the fact of the injury of the urethra, we apprehended a re-contraction, and a large bougie was therefore carefully introduced at intervals of a few days, and he was cautioned against neglecting its occasional use. No tendency to contract was observed while he remained with us, and he was discharged cured May 8th, 1863.

CASE IV.—William Sutton, æt. 25, a boatman, was admitted into the New York Hospital, May 20th, 1863, with stone in the bladder. He was a delicate-looking, highly scrofulous man, with ankylosis of one hip, from old disease of the joint, abscesses connected with which were still discharging freely. The symptoms of stone had been coming on gradually during a year previous to his admission, and were well-marked. Examination with a sound readily detected the presence of a calculus.

After a few days of preparatory treatment, the median operation was performed on the 26th of May. Anticipating a large stone, the incision was begun well back to the prostate gland, and made more free than usual forward. The prostate was dilated with great ease, and the bladder entered with the finger, a large stone presenting itself. The forceps being introduced, and the stone grasped, extraction was begun, but, owing to the size of the stone, presented great difficulty. During the efforts to bring the stone through the opening, the stone gave way and broke into numerous fragments, not, however, before pretty severe distention of the prostatic opening had taken place. The fragments, weighing in all two ounces and a half, were, after some tedious manipulation, finally removed, and the bladder cleared by a stream of warm water. To the finger, the mucous lining of the bladder gave the sensation of being much roughened, indurated and thickened; and it was observed, on the first opening of the bladder, that a considerable quantity of fluid flowed out, which seemed to be urine containing pus and flocculi of fibrin. From these facts, taken in connection with his feeble general health, I entertained a very doubtful prognosis. His progress, nevertheless, though somewhat slow, was entirely satisfactory. From its great distention, and probably the laceration of some of its sphincter fibres, the prostate did not on this occasion maintain its function of keeping the orifice of the bladder closed, as had been the case in the former operations, and the urine trickled into the bed, as is usual after the lateral and other operations. In all other respects, he did perfectly

well. He gained flesh and strength, apparently, from the moment the focus of irritation in the bladder was removed, and was discharged cured in July, 1863.

CASE V.—William J. McKnight, a boy 3 years and 4 months old, was brought to the College Clinique with stone in the bladder, the symptoms of which had existed for about six months. I operated upon him by the median incision, in the usual way, on the 17th August, 1863. Hemorrhage took place immediately on the withdrawal of the knife, and continued quite free after the removal of the calculus, which was very small. I think my incision had been prolonged forward unnecessarily, and my knife had wounded the bulb of the urethra, from whence the bleeding seemed to come. We tried to apply a ligature to the wounded vessel, and for this purpose enlarged the external wound, but to no purpose, as we could not reach the bleeding point. We then waited a considerable time, with the wound plugged with lint, but as the bleeding still continued, a small plug of lint, dipped in perchloride of iron, was introduced down to the bottom of the wound. This checked the hemorrhage, and enabled the patient to be taken to his home in Brooklyn. Four hours after the operation, the plug was taken away in order to allow the patient to pass his water, about half a pint of bloody urine passing through the wound. Bleeding again recurred, and the plug of lint, dipped in sulphate of iron, was again introduced. No further trouble was experienced. He was able to retain his water until he wished to pass it; and from the first a portion passed by the urethra. On the

fifth day, the whole of the urine passed by the natural route; and on the seventh day, he was able to stand up and pass it as he was accustomed to do. His final cure was perfect.

CASE VI.—Henry Smith, a German, æt. 30, was admitted to the New York Hospital, about the middle of August, 1863, with some symptoms on the part of the bladder, which had followed a wound of that organ, received August 9th, 1862, at the battle of Cedar Mountain. The ball had entered in front, a little to the right of the median line, about an inch above the pubes, passing through the part of skin covered with hair. It passed nearly through the body, and was cut out behind over the left sciatic notch, through which it had probably taken its course. For a week, urine flowed out through both wounds, but, after a long course of tedious suffering, the opening gradually healed, and has since remained soundly cicatrized. Owing to some difficulty in passing water, which the patient cannot explain, the catheter was employed daily during ten months. The act of micturition continued to be painful, with great irritability of the bladder, and, in fact, all the symptoms of stone gradually developed themselves. On admission, his general condition was feeble and irritable, with great distress in the region of the bladder, urine dark colored and containing a good deal of pus. A sound immediately detected the presence of a calculus, apparently of large size. The median operation of lithotomy was performed on the 25th of August. The incision was carried well back, and made quite free,

under the conviction that the stone was of considerable size. The prostate was easily dilated, and the forceps readily seized the stone, but, unfortunately, in attempting to extract it, it broke, and the numerous fragments required frequent introduction of the instrument for their complete removal. By care and patience, however, the bladder was entirely cleared, and well washed out by a stream of warm water. The hemorrhage was quite insignificant.

August 26th. Has been very comfortable, and has had some good sleep. His urine did not flow for about three hours after the operation ; and then, by a voluntary effort, he passed several ounces through the wound. Since then it has dribbled away most of the time, though he has partial control of it.

August 28th. Can hold his water four hours without inconvenience. There is now no dribbling from the wound. When he wishes to pass water, a large portion of it comes through the urethra.

From this time his progress was not interrupted by a single bad symptom. The water all passed by the urethra at the end of a week. The wound healed rapidly, and he was discharged, cured, about the end of September. The stone was found to have for a nucleus a tuft of curly hair, of the pubes which had been carried into the bladder by the ball, and there left, while the ball itself passed through.

CASE VII.—John Smith, æt. 3 years, presented himself at the College Clinique in August, 1863, with symptoms which seemed very distinctly to point to stone

in the bladder. Examination with the sound at first detected nothing, and it was only after long and careful searching, that an unequivocal "click" was obtained. The sensation was sufficiently clear to warrant an operation, which was accordingly performed by the median section in the usual way. Feeling certain that the stone was small, I did not thrust my finger entirely into the bladder, but merely dilated the prostate sufficiently to permit the introduction of a small pair of forceps. It was, however, exceedingly difficult to seize, or even to find the stone with the instrument; and it was only after repeated and long-continued trials that it was finally caught and extracted. It proved to be exceedingly small, not larger than a flattened pea. No unusual symptoms presented themselves after the operation, and he made a very rapid recovery. No note was made at the time of the behavior of the urine in passing out of the bladder during the cure.

CASE VIII.—John Conner, æt. 3 years and 6 months, came to the College, with a stone in the bladder, of which he had shown some symptoms since the age of three months. A stone was readily detected by the sound, and the median operation was performed on the 18th of February, 1864. It was found to be unusually difficult to seize the stone with the forceps, and this was accounted for by its being found lodged very high up and on the right side of the bladder, in such a manner as to give the impression of its being encysted at that point. The forceps finally dislodged it, and fortunately seizing it by a favorable diameter, it was extracted with-

out difficulty. It proved to be an elongated stone, about one inch in length, by about half that thickness, not tapering at the extremities, but rather like a section of a cylinder with the ends slightly rounded. Each end was roughened by the deposit of whitish crystals, the middle portion being smooth. It appeared to have been caught in the mucous membrane by these two rough surfaces, and held in that position by the contraction of the surrounding muscular fibres. No bad symptoms followed the operation. He held his water for about two hours, and then passed it at will through the wound, and was able from that time to pass it at regular intervals, whenever the inclination came on. Some dribbling, however, occasionally occurred. When he presented himself, two weeks after the operation, the wound was entirely and soundly healed.

CASE IX.—Thomas McMahon, æt. 4, came to the College Clinique in October, 1864, with symptoms of stone in the bladder, with which he had been suffering for about a year. I operated by the median incision, October 10th, and, without any unusual trouble, extracted a small stone. I found it difficult to procure any accurate account of his progress after the operation, except that there was no unfavorable symptom developed during the cure. His bed was reported to be dry most of the time, but occasionally wetted, as if from a voluntary effort. He was confined to bed only three or four days, and made a rapid recovery.

CASE X.—James Riley, æt. 2 years and 3 months,

a Clinique case, with calculous symptoms for about four months. In other respects, he seemed to be a healthy child. The median operation was performed December 5th, 1864, in the usual manner, except that in this instance I did not introduce my finger into the bladder, or even into the wound. In all previous operations, I had used the finger as a dilator of the prostate; but this child was so young, and his perineum so small, that I feared to do so; I therefore substituted a pair of straight, tapering dressing-forceps, which could be easily introduced into the bladder. By then opening the handles, I had a safe and efficient dilator, by the use of which I had no difficulty in seizing and extracting the stone, which was quite small. Two hours after the operation, he passed water voluntarily through the wound. Four hours afterward, he again passed it through the wound. Four hours after this, he passed it again, some little coming through the urethra. From this time all the water passed by the urethra. His recovery was not interrupted by any accident, and he was running about the room three or four days after the operation.

CASE XI.—Patrick Cahill, from Brooklyn, æt. 2 years, was operated on at the College Clinique, for stone, in the usual manner, by the median section. The calculus, when seized by the forceps, proved to be of unusual size, and it was a serious question whether it could be extracted without further incision of the prostate. By careful and steady force, the extraction was accomplished without violence, and, as far as we could judge, with-

out injury. The stone was oval in shape, tolerably smooth, and weighed four drachms, which, for so young a child, was the largest stone I have removed entire by the median section. I was somewhat surprised to find that even after so great a distention, and probably laceration of the neck of the bladder, he retained his urine $2\frac{1}{2}$ hours after the operation, and then passed it voluntarily. Five hours after, he again passed water by a voluntary effort, and this time it came partly by the cut, and partly by the urethra. After this, however, it all came by the cut for a day or two, still being under his control. The wound healed well, and he made a good recovery.

CASE XII.—Thomas Nagle, æt. 2 years and 4 months, was operated on by the median section, at the College Clinique, June 12th, 1865. A small calculus was removed without any difficulty. Three hours after the operation, no water had come from him. He then, by a voluntary effort, passed his water through the wound. From that time, there was no dribbling of urine, he having perfect control of the sphincter, and passing his water at will, at various intervals. Recovery rapid.

CASE XIII.—Patrick O'Brien, æt. 2 years and 1 month, had suffered, almost from his birth, with some irritation about his bladder, with pain and difficulty in passing his water. The urine has always been rather scanty, and is passed with more ease when the patient is on his back. About a year ago, he was examined by a

surgeon, who detected a stone. The median operation for lithotomy was performed by my clinical assistant, Dr. J. T. Kennedy, on May 25th, 1865. For a week after the operation, the water passed mostly through the urethra, but from that time came mainly through the wound, until the healing process advanced so far as to close the channel. Nothing is distinctly stated about the control of the sphincter. His recovery was complete and perfect.

CASE XIV.—Michael Docherty, æt. $4\frac{1}{2}$ years, was seen by Dr. J. T. Kennedy at the New York Dispensary, July 14th, 1865. The child had been suffering from symptoms of stone in the bladder for about two years. During this time he has passed his urine only by drops, and always with pain, which continues to increase. He is much reduced in flesh, and has a pale and anxious countenance. He lives in a dark, damp room, and is evidently poorly nourished. Dr. Kennedy performed the median section, and not finding the stone readily with the forceps, succeeded, by putting the finger into the rectum, in hooking behind the stone and pushing it through the wound. It was merely a nucleus, and weighed but ten grains. About a week after the operation, for a day or two only, the urine passed without his knowledge, but subsequently he had entire control of the sphincter. He made a good recovery.

CASE XV.—James Sloane, æt. 6 years, an irritable and strumous boy, had presented symptoms of stone in the bladder for about two years, when he came under the

professional care of my friend, Dr. W. C. Livingston, who performed the operation of median lithotomy for his relief, March 12th, 1862. The steps of the operation were precisely the same as those detailed in the previous cases, and a large stone was seized and with much difficulty extracted. Dr. Livingston says, in his note to me, "On the second day after the operation, he was out of bed and playing about the room. The water passed through the urethra freely on the fourth day, and on the eighth the wound was quite healed. He rapidly recovered his health, and was at the end of six months about twenty pounds heavier than at the time of operation."

CASE XVI.—George Shafford, æt. 26. This most interesting case I saw in consultation with Dr. Livingston, and assisted him in the operation. He had been wounded at the battle of the Wilderness, May 6th, 1864. A ball had passed through his pelvis, wounding the bladder. After dreadful hardships and much suffering, the wounds finally closed by the 1st of September. He reached his home, in New York, in January, 1865. He had then been suffering for some months with vesical irritation, which continued to grow worse and more annoying until August 6th, when Dr. Livingston first saw him. He then presented all the symptoms of stone in the bladder, which the sound readily detected. The anterior wound, which had for months been healed, now again opened and discharged urine as freely as before. He was also suffering from a very large abscess of the abdominal wall above and posterior

to the wound. His general condition was extremely reduced and feeble. On August 18th, after some preliminary and restorative treatment, Dr. Livingston performed the median operation for the removal of the stone.

The substances removed from the bladder were in three pieces. Two of them were fragments of bone, only slightly incrustated with calculous matter. The third was a regular oval calculus, three inches in its smallest and four and a half inches in its largest circumference. The finger, passed into the old bullet-wound, which was still open, went well down by the side of the bladder, though the precise point of entrance of the ball into the bladder could not be felt. The track of the wound, as it thus passed to the bladder, skirted the brim of the pelvis, and in the sharp edge of the linea ileo pectinea a notch could be felt, from which the fragments found in the bladder had evidently been detached. The large calculus, when sawn through, was found to have, as a nucleus, a fragment of bone about three quarters of an inch by half an inch in its diameter. After the removal of its contents, the bladder was carefully syringed, and water-dressing applied to the wound. His recovery was rapid and unattended by any bad symptom. The urine passed through both wounds for a few days, but by the tenth day passed entirely by the urethra. He remained under observation until his cure was in all respects complete.

CASE XVII.—Dr. J. L. Little, who has been my principal assistant in all the cases operated on at the Col-

lege Clinique, and who has, in most instances, conducted the after treatment, sends me the following cases of his own: "Blank Hales, *æt.* 3 years, living at Harlem, suffered from symptoms of stone in the bladder for about a year. August 4th, 1863, Dr. Little removed two small calculi by the median operation. Result: patient passed his urine, at intervals after the operation, partly through the wound and partly through the urethra. No dribbling through the wound. Recovery complete."

CASE XVIII.—"David Jack, *æt.* 4½. Has suffered from symptoms of hip disease for about a year. No symptom of stone until about six weeks ago, when the usual symptoms, in their severe form, appeared. November 15th, 1865, Dr. Little removed a calculus, weighing forty-five grains, by the median operation. This stone is flat and very rough on one side, while the opposite side has the appearance of having been attached to some portion of the bladder. It probably had been detached only for a short time, as the symptoms of stone were sudden in their appearance. Result: patient retained his urine for sixteen hours, and then passed a large quantity. No dribbling. It is also worthy of notice that the hip-joint disease has considerably improved since the operation." Final cure complete.

CASE XIX.—A boy named Trainor, *æt.* 9 years, presented himself at the College Clinique, during my absence in the country, with the symptoms of stone in

the bladder, which had existed for a number of years. Dr. Little performed the median operation, July 17th, 1866, and removed a moderate-sized mulberry calculus. Passed his water voluntarily two hours after the operation. Made a good recovery, and during all its progress maintained control of the urine.

CASE XX.—Thomas Clark, æt. 19 months, also a Clinique patient, had given indications of stone for about six months. Dr. Little removed, August 20th, 1866, a phosphatic calculus, weighing 55 grains, by the median section. The case did well, with perfect control of bladder from the moment of operation.

CASE XXI.—George Lawrence, æt. 4 years. Has had trouble in passing his water for about one year, with all the other usual indications of stone in the bladder. December 15th, 1866: the child having been brought by his parents to Dr. Little's office, was etherized, and the stone detected by the sound. The median operation was performed, on the spot, by Dr. Little, and two calculi, one a mere nucleus, were removed. The child passed his water voluntarily by the urethra eleven hours after the operation; and from this moment, not only was there no dribbling of urine at any time, but all the water passed by the urethra, none coming by the wound.

CASE XXII.—Dr. E. Bradley, Surgeon in the Demilt Dispensary, sends me the following case, in the operation on which I assisted him: "James Murphy, of

Irish parents, first began to have symptoms of stone about the middle of December last ; but owing to the very poor state of his general health, and the severity of the winter, the operation was delayed about two months after Dr. Bradley first saw the child." "The child is $4\frac{1}{2}$ years old, and was operated on by the median operation on the 28th of April. His system sustained very little shock from the operation, his pulse never rising over 110. He slept, the night after the operation, very quietly, for the first time in three weeks ; and as early as twenty-four hours after the operation, he passed his water through the urethra its whole length, and continued to do so afterward ; and as early as the fifth day, I noticed he had control of the water. He continued to improve, without a single bad symptom ; and at the present time, May 11th, the little fellow is playing about, as happy as ever. There was no infiltration of urine, and, on the whole, I do not see how the result of the operation could be improved in any respect."

CASE XXIII.—About two years ago, Dr. Gurdon Buck, at my suggestion, tried the median operation at St. Luke's Hospital. The patient was a young man, and the calculus was apparently of considerable size. The usual incision was made, and the bladder reached without difficulty. The contact of the finger proving the stone to be large, Dr. Buck introduced a narrow, flat bistoury, and incised the prostate a little in several directions, so as to afford more room for the exit of the stone. After some little trouble, a large stone was finally extracted. During the cure, the young man had

several smart attacks of hemorrhage from the wound, one of which was so considerable as to excite apprehension. The hemorrhage was controlled, however, and the patient recovered entirely.

